

FORM PTO-1390

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

ATTORNEY DOCKET NUMBER IN-5554	U.S. APPLICATION NO. (IF KNOWN) (SEE 37 CFR 1.51) 10/049656	
INTERNATIONAL APPLICATION NO. PCT/EP00/07890	INTERNATIONAL FILING DATE 14. August 2000 (14.08.2000)	PRIORITY DATE CLAIMED 16. August 1999 (16.08.1999)
TITLE OF INVENTION: OLIGOMERS AND POLYMERS ON THE BASIS OF DIETHYL-OCTANEDIOLS, METHOD FOR PRODUCING SAME AND THE USE THEREOF		

APPLICATION(S) FOR DO/EO/US: **Hubert BAUMGART, Heinz-Peter RINK, and Detlef KRATZ**

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371 (b) and PCT Articles 22 and 39(1).
☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date
☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☒ have been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)☒ A translation of the International Application into English (35 U.S.C. 371(C)(2)).
☒ Amendment to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ A translation of the annex to the International Preliminary Examination Report under PCT Article 36

Items 11. to 16. below concern other document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included
13. ☒ A FIRST preliminary amendment.
☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A Change of power of attorney and/or address letter.
16. ☒ Other items or information:
A copy of the cover sheet from the PCT Published Application
A copy of the cover sheet from the Priority Document

I hereby certify that the attached correspondence is being deposited with the United States Postal Service in an envelope as "Express Mail Post Office to Addressee" Mailing Label No. **EH468390720US** addressed to the Commissioner for Patents, Washington, D.C. 20231 on February 13, 2002.


Marjorie Ellis

U.S. APPLICATION NO. (If known see 37 C.F.R. 1.50)		INTERNATIONAL APPLICATION NO.		ATTORNEY'S DOCKET NUMBER	
10/049656		PCT/EP00/07890		IN-5554	
17. <input checked="" type="checkbox"/> The following fees are submitted				CALCULATIONS PTO USE ONLY	
Basic National Fee (37 CFR 1.492(a)(1)-(5)):					
Neither international preliminary examination fee (37 CFR 1.482)					
Nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO					
and International Search Report not prepared by the EPO or JPO.....				\$970.00	
International preliminary examination fee (37 CFR 1.482) not paid to USPTO					
but International Search Report prepared by the EPO or JPO.....				\$860.00	
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but international search fee (37 CFR 1.44(a)(2)) paid to USPTO.....				\$690.00	
International preliminary examination fee (37 CFR 1.482) paid to USPTO					
but all claims did not satisfy provisions of PCT Article 33(1)-(4).....				\$670.00	
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all claims satisfied provisions of PCT Article 33(1)-(4)				\$ 96.00	
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Surcharge of \$130.00 for furnishing the oath or declaration later than					
months from the earliest claimed priority date (37 CFR 1.492(e)).				\$	
Claims	Number Filed	Number Extra	Rate		
Total Claims	19 - 20 =	0	X \$18.00		
Independent claims	01 - 03 =	0	X \$80.00		
Multiple dependent claims(s) (if applicable)			+ \$270.00		
TOTAL OF ABOVE CALCULATION =				\$890.00	
Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity statement					
must also be filed. (Note 37 CFR 1.9, 1.27, 1.28).				\$	
SUBTOTAL =				\$890.00	
Processing fee of \$130.00 for furnishing the English translation later the					
months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	
TOTAL NATIONAL FEE =				\$890.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be					
accompanied by an appropriate cover sheet (37 CFR 3.26, 3.31). \$40.00 per property +				\$ 40.00	
TOTAL FEES ENCLOSED =				\$930.00	
				Amount to be: refunded \$	
				Charged \$930.00	
a. <input type="checkbox"/> A check in the amount of \$_____ to cover the above fees is enclosed.					
b. <input checked="" type="checkbox"/> Please charge my Deposit Account No. <u>23-3425</u> in the amount of <u>\$930.00</u> to cover the above fees					
A triplicate copy of this sheet is enclosed.					
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NOTE: Where an appropriate time limit under 37 CFR 1.495 has not been met, a petition to revive (37 CFR					
1.137(a) or (b)) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO:					
BASF CORPORATION			<u>Michael F. Morgan</u>		
Patent Department			SIGNATURE		
26701 Telegraph Road			<u>Michael F. Morgan</u>		
Southfield, Michigan 48034-2442			Name		
(248) 948-2355			<u>42,906</u>		
Customer No. 26922			REGISTRATION NUMBER		

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Hubert BAUMGART
Heinz-Peter RINK
Detlef KRATZ

Serial No.: This application is a National
Phase of Patent Application PCT/EP00/07890
filed 14. August 2000.

Filed: February 13, 2002

For: OLIGOMERS AND POLYMERS ON
THE BASIS OF DIETHYL-OCTANEDIOLS,
METHOD FOR PRODUCING SAME AND
THE USE THEREOF

Group Art Unit: Not Assigned

Examiner: Not Assigned

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February 13, 2002.


Marjorie Ellis

PRELIMINARY AMENDMENT UNDER 37 CFR § 1.115

Commissioner for Patents

Washington, D.C. 20231

Dear Sir:

This preliminary amendment is submitted with the application for entry into the U.S.
National Phase under Chapter II. This application is based on PCT/EP00/07890 filed on 14
August 2000.

In connection with the filing of this National Phase application, please make the
following preliminary amendments.

IN THE SPECIFICATION

After the title, please insert --This application is a National Phase Application of
Patent Application **PCT/EP00/07890** filed on 14 August 2000--

IN THE CLAIMS:

Please cancel claims 1-20.

Please add claims 21-39.

21. (New) A composition comprising a reaction product of a positionally isomeric diethyloctanediol monomer, wherein the reaction product is at least one of an oligomer and a polymer.
22. (New) The composition of claim 21, wherein the positionally isomeric diethyloctanediol is a 2,3-, 2,4-, 2,5-, 2,6-, 2,7-, 3,4-, 3,5-, 3,6- or 4,5-diethyloctanediol.
23. (New) The composition of claim 22, wherein the positionally isomeric diethyloctanediol is a 2,4-diethyloctanediol.
24. (New) The composition of claim 21, wherein the positionally isomeric diethyloctanediol is a diethyloctane-1,2-, -1,3-, -1,4-, -1,5-, -1,6-, -1,7-, -1,8-, -2,3-, -2,4-, -2,5-, -2,6-, -2,7-, -2,8-, -3,4-, -3,5-, -3,6-, -3,7-, -3,8-, -4,5-, -4,6-, -4,7-, -4,8-, -5,6-, -5,7-, -5,8-, -6,7-, -6,8- or -7,8-diol.
25. (New) The composition of claim 24, wherein the positionally isomeric diethyloctanediol is a diethyloctane-1,5-diol.
26. (New) The composition of claim 25, wherein the positionally isomeric diethyloctanediol is a 2,4-diethyloctane-1,5-diol.
27. (New) The composition of claim 21, wherein the reaction product is at least one of a polyaddition reaction product and a polycondensation reaction product.
28. (New) The composition of claim 27, wherein at least one of the polyaddition reaction product and the polycondensation reaction product comprise at least one of a polyether, a polyester, a polycarbonate, a polyurethane, a polyurea, a polyamide, a polyimide, an ether copolymer, an ester copolymer, a carbonate copolymer, a urethane copolymer, a urea copolymer, an amide copolymer, and an imide copolymer.

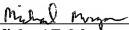
29. (New) The composition of claim 28, wherein at least one of the polyaddition reaction product and the polycondensation reaction product comprise at least one of a polyester, a polyurethane, a polyester-co-polyether, a polyester-co-polycarbonate, a polyester-co-polyurethane, a polyester-co-polyamide, a polyester-co-polyurea, and a polyester-co-polyimide.
30. (New) The composition of claim 21, wherein the reaction product has a structure that is at least one of linear, branched, block, comb, random, core/shell, and the form of crosslinked microparticles.
31. (New) The composition of claim 21, wherein the reaction product contains at least one of
- i) functional groups that undergo crosslinking reactions with complementary functional groups present in at least one of the reaction products themselves and in separate compounds, and
 - ii) functional groups, which on exposure to actinic radiation, react with at least one of one another and with other groups.
32. (New) The composition of claim 21, wherein the reaction products are grafted with olefinically unsaturated monomers.
33. (New) The composition of claim 21, wherein the composition is one of a molding compound, an adhesive, a coating material, and a paint.
34. (New) The composition of claim 21, wherein the composition is one of a molding, a film, a fiber, an adhesive film, a decorative coating, a protective coating, and a decorative and protective coating.
35. (New) A method comprising applying the composition of claim 21 to a substrate.
36. (New) The substrate prepared by the method of claim 35.

37. (New) The method of claim 35, wherein the substrate is one of a motor vehicle body, an industrial component, an electrical component, a coil, a package, and furniture.
38. (New) The method of claim 35, wherein at least one of the following:
- the positionally isomeric diethyloctanediol is a 2,3-, 2,4-, 2,5-, 2,6-, 2,7-, 3,4-, 3,5-, 3,6- or 4,5-diethyloctanediol;
 - the positionally isomeric diethyloctanediol is a diethyloctane-1,2-, -1,3-, -1,4-, -1,5-, -1,6-, -1,7-, -1,8-, -2,3-, -2,4-, -2,5-, -2,6-, -2,7-, -2,8-, -3,4-, -3,5-, -3,6-, -3,7-, -3,8-, -4,5-, -4,6-, -4,7-, -4,8-, -5,6-, -5,7-, -5,8-, -6,7-, -6,8- or -7,8-diol;
 - the positionally isomeric diethyloctanediol is a 2,4-diethyloctane-1,5-diol;
 - the reaction product is at least one of a polyaddition reaction product and a polycondensation reaction product;
 - the reaction product is at least one of a polyether, a polyester, a polycarbonate, a polyurethane, a polyurea, a polyamide, a polyimide, an ether copolymer, an ester copolymer, a carbonate copolymer, a urethane copolymer, a urea copolymer, an amide copolymer, an imide copolymer, a polyester-copolyether, a polyester-co-polycarbonate, a polyester-co-polyurethane, a polyester-co-polyamide, a polyester-co-polyurea, and a polyester-copolyimide;
 - the reaction product has a structure that is at least one of linear, branched, block, comb, random, core/shell, and the form of crosslinked microparticles;
 - the reaction product contains at least one of
 - functional groups that undergo crosslinking reactions with complementary functional groups present in at least one of the reaction products themselves and in separate compounds, and
 - functional groups, which on exposure to actinic radiation, react with at least one of one another and with other groups;
 - the reaction products are grafted with olefinically unsaturated monomers;
 - the composition is one of a molding compound, an adhesive, a coating material, and a paint.
39. (New) The substrate prepared by the method of claim 38.

REMARKS

Upon entry of the present amendment claims 21-39 are pending in the application. New claims 21-39 add no new matter, as these claims contain subject matter deleted from the canceled claims. There are one (1) independent claim and a total of nineteen (19) claims pending in the application. Applicants respectfully request entry of the preliminary amendment.

Respectfully Submitted,



Michael F. Morgan
Registration No. 42,906

Date: February 13, 2002
BASF Corporation
26701 Telegraph Road
Southfield, Michigan 48034-2442
(248)-948-2355
Customer No. 26922

WO 01/12696

PCT/EP00/07890

Oligomers and polymers based on diethyloctanediols,
their preparation and use

The present invention relates to novel oligomers and
5 polymers containing positionally isomeric
diethyloctanediols as monomer units. The present
invention further relates to the use of the novel
oligomers and polymers for preparing molding compounds,
adhesives, and coating materials, especially paints,
10 and their successor products, i.e., the moldings,
films, fibers, adhesive films, and coatings, especially
paint systems.

In order to flexibilize polyesters or copolymers
15 containing polyester units, and moldings, adhesive
films, and coatings, especially paint systems, produced
using them, it is customary to employ the C6 units
hexane-1,6-diol and/or adipic acid. Furthermore,
polyesters and polyester-co-polyurethanes containing in
20 cocondensed form 2-methyl-1,8-octanediol and also, if
desired, nonane-1,9-diol as C9 monomer units are known
from numerous Japanese patent applications such as, for
example, JP-A-63182330, JP-A-01215876, JP-A-01242674,
JP-A-02264082, JP-A-06329751, JP-A-0493316, JP-A-
25 02264082, JP-A-02147238 or JP-A-02041379, the European
patent EP-A-0 562 577 or from the British patent GB-A-
2248844. Furthermore, the Japanese patent JP-A-09272731

reveals a polyester containing 2,7-dimethyl-1,8-octanediol as a C10 monomer unit.

These oligomers and polymers have performance
5 properties which are already good; however, in the
variation of their profile of properties, for example,
the further flexibilization, an upper limit is reached
the crossing of which is accompanied by manifest
disadvantages, such as a reduction in hardness. If,
10 therefore, there is the desire to further vary and
improve their performance properties in order that they
can be put to new end uses and/or offer new advantages
in their existing end uses, it will be necessary to
provide new monomer units and new oligomers and
15 polymers.

It is an object of the present invention, accordingly,
to provide oligomers and polymers as alternatives to
the existing ones. The new polymers and oligomers are
20 to retain the advantageous properties of the known
oligomers and polymers while additionally offering new
possibilities for varying the profile of properties,
advantageously broadly, so that they are also suitable
for new end uses.

25

The invention accordingly provides the novel oligomers
and polymers which contain at least one positionally
isomeric diethyloctanediol as monomer unit.

In the text below, these novel oligomers and polymers are referred to as "inventive oligomers and polymers".

5 The invention also provides the novel molding compounds, adhesives, and coating materials which comprise at least one inventive oligomer and/or polymer. In the text below, these novel molding compounds, adhesives, and coating materials are referred to as "inventive molding compounds, adhesives, and coating materials".

15 The invention additionally provides novel moldings, films, and fibers which can be produced from the molding compounds of the invention. In the text below they are referred to as "inventive moldings, films, and fibers".

20 The invention further provides novel adhesive films which can be produced from the inventive adhesives and are referred to below as "inventive adhesive films".

The invention not least provides novel coatings which can be produced from the inventive coating materials and are referred to below as "inventive coatings".

25 Furthermore, the invention provides novel substrates which have at least one inventive adhesive film and/or at least one inventive coating and are referred to below as "inventive substrates".

For the purposes of the present invention, oligomers are compounds containing from 2 to 15 repeating monomer units. For further details, refer to Römpf Lexikon Lacke und Druckfarben, Georg Thieme Verlag, Stuttgart, New York, 1998, page 425, "Oligomers".

By contrast, for the purposes of the present invention, polymers are compounds which contain more than 10, in particular more than 15, repeating monomer units. For further details, refer to Römpf Lexikon Lacke und Druckfarben, Georg Thieme Verlag, Stuttgart, New York, 1998, page 464, "Polymers".

The essential constituent of the inventive oligomers and polymers is at least one positionally isomeric diethyloctanediol.

The positionally isomeric diethyloctanediols for inventive use contain a linear C8 carbon chain.

With regard to the two ethyl groups, the C8 carbon chain has the following substitution pattern: 2,3, 2,4, 2,5, 2,6, 2,7, 3,4, 3,5, 3,6 or 4,5. In accordance with the invention it is of advantage if the two ethyl groups are in positions 2 and 4, i.e., if the compounds are 2,4-diethyloctanediols.

With regard to the two hydroxyl groups, the C8 carbon chain has the following substitution pattern: 1,2, 1,3,

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1,4, 1,5, 1,6, 1,7, 1,8, 2,3, 2,4, 2,5, 2,6, 2,7, 2,8,
3,4, 3,5, 3,6, 3,7, 3,8, 4,5, 4,6, 4,8, 5,6, 5,7, 5,8,
6,7, 6,8 or 7,8. In accordance with the invention it is
of advantage if the two hydroxyl groups are in
5 positions 1 and 5, i.e., if the compounds are
diethyloctane-1,5-diols.

The two substitution patterns are combined with one
another in any desired way; i.e., the
10 diethyloctanediols for inventive use comprise

2,3-diethyloctane-1,2-, -1,3-, -1,4-, -1,5-, -1,6-,
-1,7-, -1,8-, -2,3-, -2,4-, -2,5-, -2,6-, -2,7-, -2,8-,
-3,4-, -3,5-, -3,6-, -3,7-, -3,8-, -4,5-, -4,6-, -4,7-,
15 -4,8-, -5,6-, -5,7-, -5,8-, -6,7-, -6,8- or -7,8-diol,

2,4-diethyloctane-1,2-, -1,3-, -1,4-, -1,5-, -1,6-,
-1,7-, -1,8-, -2,3-, -2,4-, -2,5-, -2,6-, -2,7-, -2,8-,
-3,4-, -3,5-, -3,6-, -3,7-, -3,8-, -4,5-, -4,6-, -4,7-,
20 -4,8-, -5,6-, -5,7-, -5,8-, -6,7-, -6,8- or -7,8-diol,

2,5-diethyloctane-1,2-, -1,3-, -1,4-, -1,5-, -1,6-,
-1,7-, -1,8-, -2,3-, -2,4-, -2,5-, -2,6-, -2,7-, -2,8-,
-3,4-, -3,5-, -3,6-, -3,7-, -3,8-, -4,5-, -4,6-, -4,7-,
25 -4,8-, -5,6-, -5,7-, -5,8-, -6,7-, -6,8- or -7,8-diol,

2,6-diethyloctane-1,2-, -1,3-, -1,4-, -1,5-, -1,6-,
-1,7-, -1,8-, -2,3-, -2,4-, -2,5-, -2,6-, -2,7-, -2,8-,

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-3,4-, -3,5-, -3,6-, -3,7-, -3,8-, -4,5-, -4,6-, -4,7-,
-4,8-, -5,6-, -5,7-, -5,8-, -6,7-, -6,8- or -7,8-diol,

2,7-diethyloctane-1,2-, -1,3-, -1,4-, -1,5-, -1,6-,
5 -1,7-, -1,8-, -2,3-, -2,4-, -2,5-, -2,6-, -2,7-, -2,8-,
-3,4-, -3,5-, -3,6-, -3,7-, -3,8-, -4,5-, -4,6-, -4,7-,
-4,8-, -5,6-, -5,7-, -5,8-, -6,7-, -6,8- or -7,8-diol,

3,4-diethyloctane-1,2-, -1,3-, -1,4-, -1,5-, -1,6-,
10 -1,7-, -1,8-, -2,3-, -2,4-, -2,5-, -2,6-, -2,7-, -2,8-,
-3,4-, -3,5-, -3,6-, -3,7-, -3,8-, -4,5-, -4,6-, -4,7-,
-4,8-, -5,6-, -5,7-, -5,8-, -6,7-, -6,8- or -7,8-diol,

3,5-diethyloctane-1,2-, -1,3-, -1,4-, -1,5-, -1,6-,
15 -1,7-, -1,8-, -2,3-, -2,4-, -2,5-, -2,6-, -2,7-, -2,8-,
-3,4-, -3,5-, -3,6-, -3,7-, -3,8-, -4,5-, -4,6-, -4,7-,
-4,8-, -5,6-, -5,7-, -5,8-, -6,7-, -6,8- or -7,8-diol,

3,6-diethyloctane-1,2-, -1,3-, -1,4-, -1,5-, -1,6-,
20 -1,7-, -1,8-, -2,3-, -2,4-, -2,5-, -2,6-, -2,7-, -2,8-,
-3,4-, -3,5-, -3,6-, -3,7-, -3,8-, -4,5-, -4,6-, -4,7-,
-4,8-, -5,6-, -5,7-, -5,8-, -6,7-, -6,8- or -7,8-diol,
or

25 4,5-diethyloctane-1,2-, -1,3-, -1,4-, -1,5-, -1,6-,
-1,7-, -1,8-, -2,3-, -2,4-, -2,5-, -2,6-, -2,7-, -2,8-,
-3,4-, -3,5-, -3,6-, -3,7-, -3,8-, -4,5-, -4,6-, -4,7-,
-4,8-, -5,6-, -5,7-, -5,8-, -6,7-, -6,8- or -7,8-diol.

The positionally isomeric diethyloctanediols for inventive use can be used as individual compounds or as mixtures of two or more diethyloctanediols for preparing the inventive oligomers and polymers.

5

Particular advantages result from the use of 2,4-diethyloctane-1,5-diol.

The positionally isomeric diethyloctanediols for
10 inventive use are compounds which are known per se and
they can be prepared with the aid of customary and
known synthesis methods of organic chemistry such as
base-catalyzed aldol condensation or are obtained as
by-products of large-scale chemical syntheses such as
15 the preparation of 2-ethylhexanol.

Their fraction in the inventive oligomers and polymers
 may vary extremely widely and is guided by the
 particular end use of the inventive oligomers and
 20 polymers and by their profile of properties required
 for said use. In accordance with the invention it is of
 advantage if they are present in the starting products
 of the inventive oligomers and polymers in an amount,
 based on the starting products, of from 2 to 60% by
 25 weight, preferably from 3 to 55% by weight, with
 particular preference from 5 to 50% by weight, and in
 particular from 7 to 45% by weight.

The inventive oligomers and polymers come from the customary and known oligomer and polymer classes. For further details refer to Römpf Lexikon Lacke und Druckfarben, Georg Thieme Verlag, Stuttgart, New York, 1998, page 464, "Polymers". It is essential that, during the preparation of the inventive oligomers and polymers, the positionally isomeric diethyloctanediols for inventive use are incorporated into these oligomers and polymers as monomer units.

10

The inventive oligomers and polymers are of linear or branched construction. In the inventive oligomers and polymers it is also possible to have combinations of linear chains with highly branched chains. In respect of the monomer units, the oligomer chains and polymer chains are of block, comb or random construction. Of course, these construction principles may be combined with one another as desired. Furthermore, the inventive oligomers and polymers may have a core/shell structure and/or may be present in the form of crosslinked microparticles.

Accordingly, the number-average molecular weight M_n and the molecular weight polydispersity M_w/M_n of the inventive oligomers and polymers may also vary extremely widely depending on end use and structure. In accordance with the invention, number-average molecular weights M_n of from 700 to 2 000 000 are of advantage. Within this range, further particular advantages are

afforded by number-average molecular weights M_n of from 1000 to 1 500 000, in particular from 2000 to 1 000 000. The molecular weight polydispersity M_w/M_n in this case is advantageously from 1.1 to 20, preferably from 1.2 to 15 and in particular from 1.3 to 10.

Examples of advantageous inventive oligomers and polymers are polyaddition resins, polycondensation resins, or resins prepared by polyaddition and polycondensation. For further details, refer to Römpf Lexikon Lacke und Druckfarben, Georg Thieme Verlag, Stuttgart, New York, 1998, page 457, "Polyaddition" and "Polyaddition resins (polyadducts)", and also pages 463 and 464, "Polycondensates", "Polycondensation", and "Polycondensation resins".

Examples of advantageous inventive polyaddition resins and/or polycondensation resins are polyethers, polyesters, polycarbonates, polyurethanes, polyureas, polyamides, polyimides or copolymers which contain ether, ester, carbonate, urethane, urea, amide and/or imide groups in the oligomer and/or polymer chains.

Examples of particularly advantageous inventive polyaddition resins and/or polycondensation resins are polyesters, polyurethanes, polyester-co-polyethers, polyester-co-polycarbonates, polyester-co-polyurethanes, polyester-co-polyamides, polyester-co-polyureas or polyester-co-polyimides.

Of these, in turn, the polyesters, the polyurethanes, and the polyester-co-polyurethanes are especially advantageous.

5 Viewed in terms of its method, their preparation has no special features but instead takes place in accordance with the customary and known methods of preparing polycondensation resins and polyaddition resins.

10 For example, the inventive polyesters are obtainable by reacting polycarboxylic acids and the above-described positionally isomeric diethyloctanediols for inventive use, and also, where appropriate, further polyols and/or monocarboxylic acids.

15 Examples of suitable polycarboxylic acids are aromatic polycarboxylic acids such as terephthalic acid, isophthalic acid, phthalic acid, trimellitic acid or pyromellitic acid, and their ring-substituted alkyl
20 derivatives; cycloaliphatic polycarboxylic acids such as tetrahydrophthalic acid, 1,2-cyclobutanedicarboxylic acid, 1,3-cyclobutanedicarboxylic acid, 1,2-cyclopentanedicarboxylic acid, 1,3-cyclopentanedicarboxylic acid, hexahydrophthalic acid, 1,3-cyclohexane-
25 dicarboxylic acid, 1,4-cyclohexanedicarboxylic acid, 4-methylhexahydrophthalic acid or tricyclodecanedicarboxylic acid, which may be used both in their cis form and in their trans form and also as a mixture of both forms; or acyclic polycarboxylic acids such as

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oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, pimelic acid, suberic acid, azelaic acid, sebacic acid, undecanedicarboxylic acid or dodecanedicarboxylic acid, maleic acid, fumaric acid, itaconic acid, citraconic acid or dimer fatty acids.

Also suitable in accordance with the invention are the esterifiable derivatives of the abovementioned polycarboxylic acids such as their monoesters or polyesters with aliphatic alcohols having from 1 to 4 carbon atoms or hydroxy alcohols having from 1 to 4 carbon atoms, for example. It is also possible, moreover, to use the anhydrides of the abovementioned polycarboxylic acids, where they exist.

Examples of suitable monocarboxylic acids that may be employed are 2-ethylhexanoic acid, 3,3,5-trimethylhexanoic acid, isononanoic acid, pelargonic acid, fatty acids from coconut oil, fatty acids of natural oils, resin acids, benzoic acid or p-tert-butylbenzoic acid.

Examples of suitable polyols, which may be used in addition to the positionally isomeric diethyl-octanediols for inventive use for the purposes of further varying the profile of properties, as starting products, are diols such as ethylene glycol, 1,2- or 1,3-propanediol, methylpropane-1,3-diol, ether oligomers of ethylene glycol and propylene glycol such

as diethylene glycol or dipropylene glycol, 1,2-, 1,3-
or 1,4-butanediol, 1,2-, 1,3-, 1,4- or 1,5-pentanediol,
1,2-, 1,3-, 1,4-, 1,5- or 1,6-hexanediol, neopentyl
hydroxypivalate, neopentyl glycol, 1,2-, 1,3- or 1,4-
5 cyclohexanediol, 1,2-, 1,3- or 1,4-cyclo-
hexanedimethanol, tricyclodecanedimethanol (TCD),
trimethylpentanediol, ethylbutylpropanediol,
octanediols, nonanediols, 2-butyl-2-ethylpropane-1,3-
diol, 2-butyl-2-methylpropane-1,3-diol, 2-phenyl-2-
10 methylpropane-1,3-diol, 2-propyl-2-ethylpropane-1,3-
diol, 2-di-tert-butylpropane-1,3-diol, 2-butyl-2-
propylpropane-1,3-diol, 1-dihydroxymethyl-
bicyclo[2.2.1]heptane, 2,2-diethylpropane-1,3-diol,
2,2-dipropylpropane-1,3-diol 2-cyclohexyl-2-methyl-
15 propane-1,3-diol, 2,5-dimethylhexane-2,5-diol, 2,5-
diethylhexane-2,5-diol, 2-ethyl-5-methylhexane-2,5-
diol, 2,4-dimethylpentane-2,4-diol, 2,3-dimethylbutane-
2,3-diol, 1,4-(2'-hydroxypropyl)-benzene, 1,3-(2'-
hydroxypropyl)-benzene or dimer diols from dimer fatty
20 acids; or triols such as glycerol, trimethylolethane,
trimethylolpropane, trihydroxyethyl isocyanurate or
pentaerythritol.

The diols and the triols are employed here in a molar
25 ratio which results in the desired degree of branching.

The inventive polyesters are prepared by the known
methods of esterification, such as are described, for
example, in DE-A-40 24 204, page 4 lines 50 to 65. This

reaction normally takes place at temperatures between 180 and 280°C, if desired in the presence of a suitable esterification catalyst, such as lithium octoate, dibutyltin oxide, dibutyltin dilaurate or para-
5 toluenesulfonic acid, for example.

The preparation of the inventive polyesters is normally conducted in the presence of small amounts of a suitable solvent as azeotrope former. Examples of
10 azeotrope formers used include aromatic hydrocarbons, such as particularly xylene, and (cyclo)aliphatic hydrocarbons, e.g., cyclohexane or methylcyclohexane.

Where the inventive polyesters still contain at least
15 one, preferably at least two, and in particular two, free hydroxyl groups, they may serve in a particularly advantageous way for preparing further inventive polymers, i.e., polyester-co-polymers, which constitutes a further very particular advantage of the
20 inventive polyesters.

By way of example, the inventive polyurethanes are obtainable by the customary and known methods of polyurethane chemistry from polyisocyanates and the
25 positionally isomeric diethyloctanediols for inventive use, and, if desired, further compounds which contain at least one, preferably at least two, functional groups which are reactive toward isocyanate groups. Instead of the positionally isomeric diethyloctanediols

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for inventive use, or in addition to them, use is also made with particular advantage of the above-described inventive polyesters, thereby giving the inventive polyester-co-polyurethane.

5

Examples of suitable polyisocyanates are isophorone diisocyanate (= 5-isocyanato-1-isocyanatomethyl-1,3,3-trimethylcyclohexane), 5-isocyanato-1-(2-isocyanatoethyl-yl)-1,3,3-trimethyl-cyclohexane, 5-isocyanato-1-(3-isocyanatoprop-1-yl)-1,3,3-trimethyl-cyclohexane, 5-isocyanato-(4-isocyanatobut-1-yl)-1,3,3-trimethyl-cyclohexane, 1-isocyanato-2-(3-isocyanatoprop-1-yl)-cyclohexane, 1-isocyanato-2-(3-isocyanatoethyl-yl)cyclohexane, 1-isocyanato-2-(4-isocyanatobut-1-yl)-cyclohexane, 1,2-diisocyanatocyclobutane, 1,3-diisocyanatocyclobutane, 1,2-diisocyanatocyclopentane, 1,3-diisocyanatocyclopentane, 1,2-diisocyanatocyclohexane, 1,3-diisocyanatocyclohexane, 1,4-diisocyanatocyclohexane, dicyclohexylmethane 2,4'-diisocyanate, liquid bis(4-isocyanatocyclohexyl)methane with a trans/trans content of up to 30% by weight, which is obtainable by phosgenating isomer mixtures of bis(4-aminocyclohexyl)methane or by fractional crystallization of commercial bis(4-isocyanatocyclohexyl)methane, as described in the patents DE-A-44 14 032, GB-A-1220717, DE-A-16 18 795 or DE-A-17 93 785, trimethylene diisocyanate, tetramethylene diisocyanate, pentamethylene diisocyanate, hexamethylene diisocyanate, ethylethylenediisocyanate,

- trimethylhexane diisocyanate, heptanemethylene diisocyanate or diisocyanates derived from dimer fatty acids, as sold under the commercial designation DDI 1410 by Henkel and described in the patents WO 97/49745 and WO 97/49747, especially 2-heptyl-3,4-bis(9-isocyanatononyl)-1-pentylcyclohexane, or 1,2-, 1,4- or 1,3-bis(isocyanatomethyl)cyclohexane, 1,2-, 1,4- or 1,3-bis(2-isocyanatoethyl-1-yl)cyclohexane, 1,3-bis(3-isocyanatoprop-1-yl)cyclohexane, 1,2-, 1,4- or 1,3-bis(4-isocyanatobut-1-yl)cyclohexane, tolylene diisocyanate, xylylene diisocyanate, bisphenylene diisocyanate, naphthylene diisocyanate or diphenylmethane diisocyanate.
- 15 Examples of suitable further compounds which may be employed as starting products and which contain at least one, preferably at least two, functional groups reactive toward isocyanate groups are
- 20 - saturated and unsaturated high and low molecular mass diols and, in minor amounts, triols for introducing branches, especially the above-described diols and triols,
- 25 - polyamines,
- amino alcohols, and

- compounds by which stabilizing (potentially) ionic and/or nonionic functional groups are introduced.

Further examples of highly suitable compounds of this
5 kind and also processes for preparing polyurethanes,
especially polyester-co-polyurethanes, are known from
the patents EP-A-0 073 517, EP-A-0 089 497, EP-A-
0 228 003, EP-A-0 234 361, EP-A-0 543 817 or EP-A-
0 574 417.

10

Further particular advantages result if the inventive
oligomers and polymers are reacted with olefinically
unsaturated monomers to give graft copolymers.

15 Examples of suitable olefinically unsaturated monomers
include

- (meth)acrylic esters substantially free from acid
groups,
- 20 - monomers which carry per molecule at least one
hydroxyl group and are substantially free from
acid groups, such as hydroxyalkyl esters of
acrylic acid, methacrylic acid or another
25 alpha,beta-olefinically unsaturated carboxylic
acid which derive from an alkylene glycol which is
esterified with the acid or which are obtainable
by reacting the alpha,beta-olefinically

unsaturated carboxylic acid with an alkylene oxide,

5 - monomers which carry per molecule at least one acid group which can be converted into the corresponding acid anion group,

10 - vinyl esters of alpha-branched monocarboxylic acids having from 5 to 18 carbon atoms in the molecule,

15 - reaction products of acrylic acid and/or methacrylic acid with the glycidyl ester of an alpha-branched monocarboxylic acid having from 5 to 18 carbon atoms per molecule,

20 - cyclic and/or acyclic olefins such as ethylene, propylene, but-1-ene, pent-1-ene, hex-1-ene, cyclohexene, cyclopentene, norbornene, butadiene, isoprene, cyclopentadiene and/or dicyclopentadiene, especially ethylene,

- (meth)acrylamides,

25 - monomers containing epoxide groups such as the glycidyl esters of ethylenically unsaturated carboxylic acids,

- vinylaromatic hydrocarbons,

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- nitriles,
- vinyl compounds, especially vinyl halides and/or vinylidene dihalides, N-vinylpyrrolidone, vinyl esters or vinyl ethers,
- allyl compounds, especially allyl ethers and allyl esters.

10 Further examples of suitable olefinically unsaturated monomers and also suitable methods of graft copolymerization are described, for example, in the patents EP-A-0 521 928, EP-A-0 730 613 or EP-A-0 787 159.

15 The inventive oligomers and polymers may contain functional groups which undergo crosslinking reactions with complementary functional groups. These complementary functional groups may be present in the
20 inventive oligomers and polymers themselves, which as a result become self-crosslinking. Alternatively, the complementary functional groups may be present in compounds which exist separately from the inventive oligomers and polymers. Mixtures of this kind are
25 referred to by those in the art as externally crosslinking systems, and the relevant compounds as crosslinking agents. In these externally crosslinking systems, the inventive oligomers and polymers take over the function of the binders.

Examples of suitable complementary functional groups for inventive use which undergo crosslinking reactions are assembled in the following overview. In the overview the variable R stands for an acyclic or cyclic aliphatic radical, an aromatic radical and/or an aromatic-aliphatic (araliphatic) radical; the variables R¹ and R² stand for identical or different aliphatic radicals or are linked to one another to form an aliphatic or heteroaliphatic ring.

10

**Overview: Examples of complementary functional groups
in the**

Binder (self-crosslinking)

15

Binder and crosslinking agent

or

Crosslinking agent and binder

20

-SH

-C(O)-OH

-NH₂

-C(O)-O-C(O)-

-OH

-NCO

25

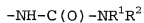
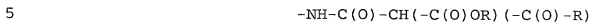
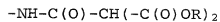
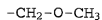
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-NH-C(O)-OR

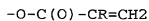
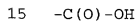
-O-(CO)-NH₂

-CH₂-OH

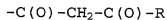
- 20 -



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Instead of these complementary functional groups or in addition to them, the inventive oligomers and polymers may contain functional groups which react with one

another or with other groups when exposed to actinic radiation. Examples of suitable groups of this kind are the allyl and vinyl groups set out above. Further examples of suitable groups are acrylate and methacrylate groups, especially acrylate groups. The actinic radiation may comprise electromagnetic radiation such as X-rays, UV radiation, visible light or near IR (NIR) light, or corpuscular radiation such as electron beams.

The inventive oligomers and polymers described above are outstandingly suitable for preparing molding compounds, adhesives, and coating materials, especially paints.

For preparing the molding compounds of the invention it is possible to use inventive liquid or solid oligomers and polymers which contain the functional groups described above, so that they can be processed conventionally by heating and/or by exposure to actinic radiation to give thermoset inventive moldings, films, and fibers. However, it is advantageous to use solid inventive oligomers and polymers which have thermoplastic properties and no longer contain any reactive functional groups, so that they may be processed conventionally, for example, by extrusion followed by injection molding, film blowing or the drawing of fibers to give the thermoplastic inventive moldings, films, and fibers.

The inventive moldings, films, and fibers may be adhesively bonded outstandingly with the adhesives of the invention and/or coated or painted outstandingly with the inventive coating materials.

5

The inventive molding compounds are composed of the inventive oligomers and polymers or they comprise conventional plastics additives in effective amounts.

10 For the preparation of inventive adhesives which serve as contact adhesives, it is preferred to use inventive oligomers and polymers which contain only a very small amount, if any, of the functional groups described above.

15

For preparing inventive adhesives which serve as reactive adhesives, it is preferred to use inventive oligomers and polymers which possess a relatively large amount of the functional groups described above, so
20 that they can be cured thermally and/or with actinic radiation. In addition, the inventive adhesives may comprise the additives described below for the coating materials, provided they are suitable for use in adhesives.

25

By means of the inventive adhesives, the substrates described below, particularly the inventive moldings, films, and fibers, can be adhesively bonded outstandingly.

With very particular preference, the inventive oligomers and polymers are used for preparing coating materials, especially paints. For this end use it is preferred to use oligomers and polymers which contain
5 the above-described functional groups. The inventive coating materials here are self-crosslinking or externally crosslinking in the sense referred to above, but especially externally crosslinking. Furthermore, they are curable thermally or with actinic radiation,
10 or thermally and with actinic radiation, the latter being referred to by those in the art as dual cure.

The selection of the respective complementary functional groups is guided on the one hand by the
15 consideration that during storage they must not undergo any unwanted reactions and/or, where appropriate, must not disrupt or inhibit the curing with actinic radiation, and secondly by the temperature range with which thermal curing is to take place.

20 Particularly in respect of heat-sensitive substrates such as plastics, it is of advantage here in accordance with the invention to choose a temperature range which does not exceed 100°C, especially 80°C. In the light of
25 these boundary conditions, hydroxyl groups and isocyanate groups or carboxyl groups and epoxy groups have proven advantageous as complementary functional groups, and so are employed preferably in accordance with the invention in the inventive coating materials

that are in the form of two-component or multicomponent systems. Particular advantages result if the hydroxyl groups are used as functional groups in the binders and the isocyanate groups as functional groups in the crosslinking agents.

Where higher crosslinking temperatures, for example, from 100°C to 180°C, may be employed, inventive coating materials suitably include one-component systems, in which the functional groups in the binders are preferably thio, amino, hydroxyl, carbamate, allophanate, carboxyl and/or (meth)acrylate groups, but especially hydroxyl groups, and the functional groups in the crosslinking agents are preferably anhydride, carboxyl, epoxy, blocked isocyanate, urethane, methylol, methylol ether, siloxane, amino, hydroxyl and/or beta-hydroxyalkylamide groups.

In the context of the present invention, a one-component (1K) system is a thermosetting coating material in which the binder and the crosslinking agent are present alongside one another, i.e., in one component. A prerequisite for this is that the two constituents crosslink with one another only at relatively high temperatures and/or on exposure to actinic radiation.

The inventive coating material may further be a two-component (2K) or multicomponent (3K, 4K) system.

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In the context of the present invention, this means a coating material in which, in particular, the binder and the crosslinking agent are present separately from one another in at least two components which are not
5 combined until shortly before application. This form is chosen when binder and crosslinking agent react with one another even at room temperature. Coating materials of this kind are employed in particular for coating heat-sensitive substrates, especially in automotive
10 refinish.

Not least, it is possible for the inventive coating materials to be physically curing, i.e., to crosslink by loss of solvent from the applied coating materials
15 and/or by coalescence of the binder particles. Linking within the coatings takes place by looping of the polymer chains to the binders. For further details, refer to Römpp Lexikon Lacke und Druckfarben, Georg Thieme Verlag, Stuttgart, New York, 1998, pages 274 and
20 275, "Curing".

The inventive coating material is used for producing decorative and/or protective coatings, especially paint systems such as transparent clearcoats, primers,
25 especially antistonechip primers and surfacers, or color and/or effect paint systems, especially topcoats and basecoats. These paint systems may comprise one or more coats.

For these end uses, it is normally the case that customary coatings additives in effective amounts are added to the inventive coating material. The nature and amount of the additives are guided in particular by the end use of the inventive coating material. Preferably, these additives are not volatile under the processing and application conditions of the inventive coating material.

10 Where the inventive coating material is used as a topcoat or basecoat material, it comprises color and/or effect pigments in customary and known amounts. The pigments may be composed of organic or inorganic compounds and may impart effect and/or color. Owing to
15 this large number of suitable pigments, therefore, the inventive coating material ensures a universal scope for use of the coating materials and makes it possible to realize a large number of shades and optical effects.

20 Furthermore, the inventive coating material may comprise organic and inorganic fillers in customary and known effective amounts. Examples of suitable fillers are chalk, calcium sulfates, barium sulfate, silicates
25 such as talc or kaolin, silicas, oxides such as aluminum hydroxide or magnesium hydroxide, or organic fillers such as textile fibers, cellulose fibers, polyethylene fibers or wood flour.

These additives are omitted if the inventive coating materials are used as clearcoat materials.

Examples of suitable additives which may be present both in the clearcoat and in the topcoat materials of the invention are

- customary and known oligomeric and polymeric binders such as thermally curable hydroxyl-containing linear and/or branched and/or block, comb and/or random poly(meth)acrylates or acrylate copolymers, polyesters, alkyds, aminoresins, polyurethanes, acrylated polyurethanes, acrylated polyesters, polylactones, polycarbonates, polyethers, epoxy resin-amine adducts, (meth)-acrylated diols, partially hydrolyzed polyvinyl esters or polyureas, or actinic-radiation-curable (meth)acryloyl-functional (meth)acrylate copolymers, polyether acrylates, polyester acrylates, unsaturated polyesters, epoxy acrylates, urethane acrylates, amino acrylates, melamine acrylates, silicone acrylates, and the corresponding methacrylates;
- customary and known reactive diluents curable thermally and/or with actinic radiation, such as the diethyloctanediols per se for inventive use, (meth)acrylates with a functionality of two or

more, or polyisocyanates containing (meth)acrylate groups;

5 - UV absorbers and light stabilizers such as
benzotriazoles, triazines or oxalanilides;

- free-radical scavengers such as HALS compounds;

10 - thermolabile free-radical initiators such as
organic peroxides, organic azo compounds or C-C-
cleaving initiators such as dialkyl peroxides,
peroxocarboxylic acids, peroxodicarbonates,
peroxide esters, hydroperoxides, ketone peroxides,
azo dinitriles or benzpinacol silyl ethers;

15 - crosslinking catalysts such as dibutyltin
dilaurate or lithium decanoate;

20 - photoinitiators such as those of the Norrish II
type whose mechanism of action is based on an
intramolecular variant of the hydrogen abstraction
reactions such as occur diversely in photochemical
reactions (by way of example, refer here to Römpp
Chemie Lexikon, 9th expanded and revised edition,
25 Georg Thieme Verlag Stuttgart, vol. 4, 1991) or
cationic photoinitiators (by way of example, refer
here to Römpp Lexikon Lacke und Druckfarben, Georg
Thieme Verlag Stuttgart, 1998, pages 444 to 446),

- film-forming auxiliaries such as cellulose derivatives;
- transparent fillers based on silica, alumina or zirconium oxide; for further details reference is made to Römpp Lexikon Lacke und Druckfarben, Georg Thieme Verlag, Stuttgart, 1998, pages 250 to 252;
- sag control agents such as ureas, modified ureas and/or silicas, as described for example in the references EP-A-192 304, DE-A-23 59 923, DE-A-18 05 693, WO 94/22968, DE-C-27 51 761, WO 97/12945 or "farbe + lack", 11/1992, pages 829 ff.;
- rheology control additives such as those known from patents WO 94/22968, EP-A-0 276 501, EP-A-0 249 201 or WO 97/12945; crosslinked polymeric microparticles, such as disclosed, for example, in EP-A-0 008 127; inorganic phyllosilicates such as aluminum-magnesium silicates, sodium-magnesium and sodium-magnesium-fluorine-lithium phyllosilicates of the montmorillonite type; silicas such as Aerosils; or synthetic polymers containing ionic and/or associative groups such as polyvinyl alcohol, poly(meth)acrylamide, poly(meth)acrylic acid, polyvinylpyrrolidone, styrene-maleic anhydride or ethylene-maleic anhydride copolymers and their

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derivatives, or hydrophobically modified
ethoxylated urethanes or polyacrylates;

- flame retardants and/or

5

- flatting agents.

Further examples of suitable coatings additives are
described in the textbook "Lackadditive" [Additives for
10 coatings] by Johan Bieleman, Wiley-WCH, Weinheim, New
York, 1998.

These additives are added to the inventive coating
materials in customary and known, effective amounts.

15

The material composition of the inventive coating
materials may vary extremely widely depending on their
intended use, which is a further essential advantage of
the coating materials. In general it is advisable to
20 employ the amounts of binders, crosslinking agents, and
additives that are known from the prior art. Of
advantage in this context are inventive coating
materials which [lacuna]

25 - from 1 to 90% by weight, preferably from 2 to 80%
by weight, with particular preference from 3 to
75% by weight, and in particular from 4 to 70% by
weight of at least one inventive oligomer and
polymer,

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- from 0 to 60% by weight, preferably from 1 to 50% by weight, with particular preference from 2 to 45% by weight, and in particular from 4 to 40% by weight of at least one crosslinking agent, and

5

- from 0 to 90% by weight, preferably from 0.1 to 80% by weight, with particular preference from 0.5 to 75% by weight, and in particular from 1 to 70% by weight of at least one additive,

10

the percentages being based on the solids content of the inventive coating material concerned and adding up to 100% by weight.

- 15 The coating material may be present in different forms.

Thus, given an appropriate choice of its above-described constituents, it may be present in the form of a liquid coating material which is essentially free

20 from organic solvents and/or water (100% system).

However, the coating material may also comprise a solution or dispersion of the above-described constituents in organic solvents and/or water. It is a

25 further advantage of the coating material that in this case it is possible to establish solids contents of up to more than 80% by weight, based on the coating material.

Moreover, given an appropriate choice of its above-described constituents, the coating material may be a powder coating material. For this purpose, the crosslinking agent may have been microencapsulated if
5 it is a polyisocyanate. This powder coating material may then, if desired, be dispersed in water, to give a powder slurry coating material.

10 The coating material may also be a two-component or multicomponent system described above in which at least the crosslinking agent is stored separately from the other constituents and is not added to them until shortly before use. In this case, the coating material of the invention may also be aqueous, the crosslinking
15 agent preferably being present in a component comprising a solvent.

Furthermore, the coating material may be part of a so-called mixer system or modular system, as described,
20 for example, in patents DE-A-41 10 520, EP-A-0 608 773, EP-A-0 614 951 or EP-A-0 471 972.

The preparation of the coating material from its constituents has no special features but instead takes
25 place in a customary and known manner by mixing the constituents in appropriate mixing equipment such as stirred vessels, dissolvers or extruders in accordance with the techniques suitable for the preparation of the respective coating materials.

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The coating material of the invention is used to produce the inventive coating systems, especially multicoat systems ML, on primed or unprimed substrates.

- 5 Suitable substrates are all surfaces to be coated which are not damaged by curing of the coatings present thereon using heat and/or actinic radiation; examples are the inventive moldings, films, and fibers; metals, plastics, wood, ceramic, stone, textile, fiber
- 10 composites, leather, glass, glass fibers, glass wool, rock wool, mineral- and resin-bound building materials, such as plasterboard and cement slabs or roof shingles, and also assemblies of these materials. Accordingly, the multicoat system of the invention is also suitable
- 15 for applications outside of motor vehicle finishing, especially automobile finishing, being suitable in particular for furniture coating and industrial coating, including coil coating and container coating. In the context of industrial coatings it is suitable
- 20 for coating virtually all parts, for private or industrial use, such as radiators, domestic appliances, small metal parts, such as nuts and bolts, hubcaps, wheel rims, packaging or electrical components such as motor windings or transformer windings.

25

In the case of electrically conductive substrates it is possible to use primers which are produced in a customary and known manner from electrodeposition coating materials. For this purpose, both anodic and

cathodic electrodeposition coating materials are suitable, but especially cathodic materials.

Using the multicoat system of the invention it is also possible in particular to coat primed or unprimed plastics such as, for example, ABS, AMMA, ASA, CA, CAB, EP, UF, CF, MF, MPF, PF, PAN, PA, PE, HDPE, LDPE, LLDPE, UHMWPE, PET, PMMA, PP, PS, SB, PUR, PVC, RF, SAN, PBT, PPE, POM, PUR-RIM, SMC, BMC, PP-EPDM, and UP (abbreviated codes in accordance with DIN 7728T1). The plastics to be coated may of course also be polymer blends, modified plastics, or fiber reinforced plastics. It is also possible to employ the plastics commonly used in vehicle construction, especially motor vehicle construction.

Unfunctionalized and/or nonpolar substrate surfaces may be subjected prior to coating in a known manner to a pretreatment, such as with a plasma or by flaming, or may be provided with a water-based primer.

The multicoat systems ML of the invention may be produced in a variety of ways.

In a first preferred variant, the process of the invention comprises the following steps:

(I) preparing a surfacer film by applying a surfacer to the substrate,

(II) curing the surfacer film to give the surfacer coat,

5 (III) preparing a solid-color topcoat film by applying a solid-color topcoat material to the surfacer coat, and

10 (IV) curing the solid-color topcoat film to give the solid-color topcoat.

Another preferred variant of the process of the invention comprises the following steps:

15 (I) preparing a basecoat film by applying a basecoat material to the substrate,

(II) drying the basecoat film,

20 (III) preparing a clearcoat film by applying a clearcoat material to the basecoat film, and

(IV) jointly curing the basecoat film and the clearcoat film to give the basecoat and the clearcoat (wet-on-wet technique).

25

A third preferred variant of the process of the invention comprises the steps of:

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- (I) preparing a surfacer film by applying a surfacer to the substrate,
- (II) curing the surfacer film to give the surfacer coat,
- 5
- (III) preparing a basecoat film by applying a basecoat material to the surfacer coat,
- 10 (IV) drying the basecoat film,
- (V) preparing a clearcoat film by applying a clearcoat material to the basecoat film, and
- 15 (VI) jointly curing the basecoat film and the clearcoat film to give the basecoat and the clearcoat (wet-on-wet technique).

Which of the preferred variants is chosen depends on

20 the intended use of the multicoat systems ML of the invention. For instance, the third variant, in particular, is employed with especial preference in the context of automotive OEM finishing.

25 Accordingly, the multicoat systems ML of the invention may differ in their structure.

In a first preferred variant of the multicoat system ML of the invention,

(1) a surfacer coat which absorbs mechanical energy,
and

(2) a color and/or effect topcoat

5

lie above one another in the stated sequence.

In a second preferred variant of the multicoat system
ML of the invention,

10

(1) a surfacer coat which absorbs mechanical energy,

(2) a color and/or effect basecoat, and

15 (3) a clearcoat

lie above one another in the stated sequence.

In a third preferred variant of the multicoat system ML
20 of the invention,

(1) a color and/or effect basecoat and

(2) a clearcoat

25

lie above one another in the stated sequence. The third
preferred variant is employed in particular in the
context of coating plastics.

The application of the coating material of the invention may take place by any customary application method, such as spraying, knife coating, brushing, flow coating, dipping, impregnating, trickling or rolling.

5 The substrate to be coated may be at rest per se, with the application equipment or unit being moved. Alternatively the substrate to be coated, particularly a coil, may be moved, with the application unit being at rest relative to the substrate or being moved
10 appropriately.

It is preferred to employ spray application methods, such as compressed air spraying, airless spraying, high-speed rotation, electrostatic spray application
15 (ESTA), for example, alone or in conjunction with hot spray application such as hot air spraying, for example. Application may take place at temperatures of max. 70 to 80°C, so that appropriate application viscosities are attained without any change or damage
20 to the coating material and its overspray (which may be intended for reprocessing) during the short period of thermal stress. For instance, hot spraying may be configured in such a way that the coating material is heated only very briefly in the spray nozzle or shortly
25 before the spray nozzle.

The spray booth used for application may, for example, be operated with a circulation system, which may be temperature-controllable, and which is operated with an

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appropriate absorption medium for the overspray, an example of such medium being the coating material itself.

- 5 Where the coating material includes constituents crosslinkable with actinic radiation, application is made under illumination with visible light with a wavelength of above 550 nm, or in the absence of light. By this means, material alteration or damage to the
- 10 coating material and to the overspray is avoided.

- In general, the surfacer film, topcoat film, basecoat film and clearcoat film are applied in a wet film thickness such that their curing results in coats
- 15 having the thicknesses which are advantageous and necessary for their functions. In the case of the surfacer film, this thickness is from 10 to 150, preferably from 15 to 120, with particular preference from 20 to 100, and in particular from 25 to 90 μm ; in
- 20 the case of the topcoat it is from 5 to 90, preferably from 10 to 80, with particular preference from 15 to 60, and in particular from 20 to 50 μm ; in the case of the basecoat it is from 5 to 50, preferably from 10 to 40, with particular preference from 12 to 30 and in
- 25 particular from 15 to 25 μm , and in the case of the clearcoats it is from 10 to 100, preferably from 15 to 80, with particular preference from 20 to 70, and in particular from 25 to 60 μm .

In accordance with the invention, the surfacer film, topcoat film, basecoat film and clearcoat film may be cured thermally, with actinic radiation, or thermally and with actinic radiation, depending on their material composition. In accordance with the invention it is of advantage to cure the basecoat film only partly if at all before applying the clearcoat film, in order then to cure it together with the clearcoat film (wet-on-wet technique).

Curing may take place after a certain rest period. This period may have a duration of from 30 s to 2 h, preferably from 1 min to 1 h, and in particular from 1 min to 30 min. The rest period is used, for example, for leveling and devolatilization of the coating films or for the evaporation of volatile constituents such as solvents, water or carbon dioxide if the coating material has been applied using supercritical carbon dioxide as solvent. The rest period may be shortened and/or assisted by the application of elevated temperatures up to 80°C, provided this does not entail any damage or alteration to the coating films, such as premature complete crosslinking, for instance.

The thermal curing has no special features in terms of its method but instead takes place in accordance with the customary and known methods such as heating in a forced-air oven or irradiation with IR lamps. Thermal curing may also take place in stages. Advantageously,

it is effected at a temperature of from 50 to 100°C, with particular preference from 80 to 100°C, and in particular from 90 to 100°C, for a period of from 1 min to 2 h, with particular preference from 2 min to 1 h, 5 and in particular from 3 min to 30 min. Where the substrates used have a high capacity to withstand thermal stress, thermal crosslinking may also be conducted at temperatures above 100°C. In general it is advisable in this case not to exceed temperatures of 10 180°C, preferably 160°C, and in particular 140°C.

Given an appropriate material composition of the coating material, the thermal curing may be supplemented by curing with actinic radiation, it being 15 possible to use UV radiation and/or electron beams. If desired, it may be supplemented by or conducted with actinic radiation from other radiation sources. In the case of electron beams, it is preferred to operate under an inert gas atmosphere. This may be ensured, for 20 example, by supplying carbon dioxide and/or nitrogen directly to the surface of the coating film.

In the case of curing with UV radiation, as well, it is possible to operate under inert gas in order to prevent 25 the formation of ozone.

Curing with actinic radiation is carried out using the customary and known radiation sources and optical auxiliary measures. Examples of suitable radiation

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sources are high or low pressure mercury vapor lamps, with or without lead doping in order to open up a radiation window of up to 405 nm, or electron beam sources. The arrangement of these sources is known in principle and may be adapted to the circumstances of the workpiece and the process parameters. In the case of workpieces of complex shape such as automobile bodies, the regions not accessible to direct radiation (shadow regions) such as cavities, folds and other structural undercuts may be cured using point, small-area or all-round emitters, in conjunction with an automatic movement means for the irradiation of cavities or edges.

The equipment and conditions for these curing methods are described, for example, in R. Holmes, "U.V. and E.B. Curing Formulations for Printing Inks", Coatings and Paints, SITA Technology, Academic Press, London, United Kingdom, 1984.

Curing here may take place in stages, i.e., by multiple exposure to light or actinic radiation. This may also be done alternately, i.e., by curing in alternation with UV radiation and electron beams.

Where thermal curing and curing with actinic radiation are employed together (dual cure), these methods may be used simultaneously or in alternation. Where the two curing methods are used in alternation, it is possible,

for example, to begin with thermal curing and end with actinic radiation curing. In other cases it may prove advantageous to begin and to end with actinic radiation curing. The skilled worker is able to determine the curing method particularly appropriate to each individual case on the basis of his or her general knowledge in the art, possibly with the aid of simple preliminary experiments.

- 10 The multicoat systems ML of the invention have an outstanding profile of properties which is very well balanced in terms of mechanical properties, optical properties, corrosion resistance, and adhesion. Thus the multicoat systems ML of the invention have the
- 15 intercoat adhesion and high optical quality which the market requires and no longer give rise to any problems such as inadequate condensation resistance of the surfacer coats, cracking (mud cracking) in the basecoats, or leveling defects or surface structures in
- 20 the clearcoats.

- In particular, the multicoat system ML of the invention has an outstanding metallic effect an outstanding D.O.I. (distinctiveness of the reflected image) and
- 25 outstanding surface smoothness. It is stable to weathering, resistant to chemicals and bird droppings, is scratch resistant, and exhibits very good reflow properties.

A further important advantage is the very good overcoatability of the multicoat system ML of the invention, even without abrading. As a result, it can easily be coated with customary and known, highly scratch-resistant coating materials based on organically modified ceramic materials.

Not least, however, it proves to be a very particular advantage that by means of the processes described above it is possible to produce a multicoat system which is based exclusively on the inventive coating materials.

Accordingly, the substrates of the invention also have particular advantages such as a long service life, a better ethetic impression to the viewer, and better technological usefulness.

Examples

Example 1

The preparation of the inventive polyester 1

A 4 liter stainless steel reactor equipped with stirrer, reflux condenser, water separator and regulatable heating was charged with 195 parts by weight of hexane-1,6-diol, 720 parts by weight of trimethylolpropane, 334 parts by weight of 2,4-

diethyloctane-1,5-diol, 131 parts by weight of isononanoic acid, 1272 parts by weight of hexahydrophthalic anhydride and 104 parts by weight of xylene. The resulting mixture was slowly heated to not
5 more than 225°C and at this temperature was condensed to an acid number of 16 mg KOH/g and a viscosity of 12 dPas (60% in solvent naphtha). The resulting reaction mixture was then allowed to cool and at 130°C was diluted with 1530 parts by weight of solvent
10 naphtha. The resulting solution of the inventive polyester had a solids content of 58.5% by weight, an acid number of 16.3 mg KOH/g, and a viscosity of 11 dPas (original).

15 **Example 2**

The preparation of the inventive polyester 2

A 4 liter stainless steel reactor equipped with
20 stirrer, reflux condenser, water separator and regulatable heating was charged with 383 parts by weight of trimethylolpropane, 355 parts by weight of 2,4-diethyloctane-1,5-diol, 69 parts by weight of isononanoic acid, 676 parts by weight of
25 hexahydrophthalic anhydride and 59 parts by weight of xylene and the resulting mixture was slowly heated to not more than 225°C and at this temperature was condensed to an acid number of 17 mg KOH/g and a viscosity of 12 dPas (60% in solvent naphtha). The

resulting reaction mixture was then allowed to cool and at 130°C was diluted with 840 parts by weight of solvent naphtha. The resulting solution of the inventive polyester had a solids content of 59.5% by weight, an acid number of 17.1 mg KOH/g, and a viscosity of 13 dPas (original).

Example 3

10 The preparation of the inventive clearcoat material 1

A stirred vessel with mechanical stirrer was charged with 68.6 parts by weight of the inventive polyester 1 from example 1, 1.0 parts by weight of Tinuvin® 292 (light stabilizer from Ciba-Geigy), 1.5 parts by weight of Tinuvin® 1130 (light-stabilizer from Ciba-Geigy), 10 parts by weight of butyl diglycol acetate, 9 parts by weight of butyl glycol acetate, 7 parts by weight of methoxypropyl acetate, 9.3 parts by weight of butyl acetate and 0.2 parts by weight of BYK® 310 (leveling agent from Byk), and these constituents were mixed. Shortly before the application of the resulting mixture, 24.1 parts by weight of a crosslinking agent based on hexamethylene diisocyanate were added, after which the two-component system was homogenized.

Example 4

The production of the inventive multicoat system ML 1

- To produce the inventive multicoat system ML, use was made of customary and known steel test panels which had been coated with an electric coat, produced from a commercial electrocoat material, and with a surfacer coat, produced from a commercial surfacer. A commercial aqueous basecoat material from BASF Coatings AG was applied in a customary and known way to the surfacer coat, with a film thickness of 12 - 15 μm , and was flashed off at 80°C for 10 minutes. Finally, the inventive clearcoat material 1 from example 3 was applied with a film thickness of 40-45 μm , after which the basecoat and the clearcoat were cured at 140°C for 20 minutes (wet-on-wet technique).
- 15 The inventive multicoat system ML proved to be extremely resistant to condensation: constant condensation climate test to DIN 50017 and 53209: no blisters, index 0.
- 20 The intercoat adhesion was also outstanding: cross-cut with Tesa tearoff to DIN EN ISO 2409: GT 0.

The deformability of the coating to DIN EN ISO 1520: 1995-04 was likewise very good: Erichsen cupping: 25 6.2 mm.

These figures demonstrate the advantageous nature of the inventive multicoat system, of the inventive clearcoat material, and of the inventive polyester.

Example 5

The preparation of the inventive clearcoat material 2

5 Example 3 was repeated except that the inventive polyester 2 from example 2 was used instead of the inventive polyester 1 from example 1.

Example 6

10

The production of the inventive multicoat system ML 2

Example 4 was repeated except that the inventive clearcoat material 2 from example 5 was used instead of
15 the inventive clearcoat material 1 from example 3. The same advantageous results were obtained.

**Oligomers and polymers based on diethyloctanediols,
their preparation and use**

Claims

5

1. Oligomers and polymers which contain at least one positionally isomeric diethyloctanediol as monomer unit.

10 2. Oligomers and polymers as claimed in claim 1, characterized in that the positionally isomeric diethyloctanediol is a 2,3-, 2,4-, 2,5-, 2,6-, 2,7-, 3,4-, 3,5-, 3,6- or 4,5-diethyloctanediol.

15 3. Oligomers and polymers as claimed in claim 2, characterized in that the positionally isomeric diethyloctanediol is a 2,4-diethyloctanediol.

4. Oligomers and polymers as claimed in any of claims
20 1 to 3, characterized in that the positionally isomeric diethyloctanediol is a diethyloctane-1,2-, -1,3-, -1,4-,
-1,5-, -1,6-, -1,7-, -1,8-, -2,3-, -2,4-, -2,5-,
-2,6-, -2,7-, -2,8-, -3,4-, -3,5-, -3,6-, -3,7-, -3,8-,
-4,5-, -4,6-, -4,7-, -4,8-, -5,6-, -5,7-, -5,8-, -6,7-,
25 -6,8- or -7,8-diol.

5. Oligomers and polymers as claimed in claim 4, characterized in that the positionally isomeric diethyloctanediol is a diethyloctane-1,5-diol.

5 6. Oligomers and polymers as claimed in claim 5, characterized in that the positionally isomeric diethyloctanediol is a 2,4-diethyloctane-1,5-diol.

7. Oligomers and polymers as claimed in any of claims
10 1 to 6, characterized in that the resins in question are polyaddition resins and/or polycondensation resins.

8. Oligomers and polymers as claimed in claim 7, characterized in that the polyaddition resins and/or
15 polycondensation resins are polyethers, polyesters, polycarbonates, polyurethanes, polyureas, polyamides, polyimides or copolymers which contain ether, ester, carbonate, urethane, urea, amide and/or imide groups in the oligomer and/or polymer chains.

20

9. Oligomers and polymers as claimed in claim 8, characterized in that the polyaddition resins and/or polycondensation resins are polyesters, polyurethanes, polyester-co-polyethers, polyester-co-polycarbonates,
25 polyester-co-polyurethanes, polyester-co-polyamides, polyester-co-polyureas or polyester-co-polyimides.

10. Oligomers and polymers as claimed in any of claims 1 to 9, characterized in that they are of linear and/or

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branched and/or block, comb and/or random construction, have a core/shell structure and/or are in the form of crosslinked microparticles.

5 11. Oligomers and polymers as claimed in any of claims 1 to 10, characterized in that they contain

10 - functional groups which undergo crosslinking reactions with complementary functional groups present in the oligomers and polymers themselves and/or in separate compounds, and/or

15 - functional groups which on exposure to actinic radiation react with one another or with other groups.

20 12. Oligomers and polymers as claimed in any of claims 1 to 12, characterized in that they are grafted with olefinically unsaturated monomers.

25 13. Use of the oligomers and polymers as claimed in any of claims 1 to 12 for preparing molding compounds, adhesives, and coating materials, especially paints.

14. Molding compounds, adhesives, and coating materials, characterized in that they comprise at least one oligomer and/or polymer as claimed in any of claims 1 to 12.

15. Use of the molding compounds, adhesives, and coating materials as claimed in claim 14 for producing moldings, films, fibers, adhesive films, and decorative and/or protective coatings, especially paint systems.

5

16. Moldings, films, and fibers producible from molding compounds as claimed in claim 14.

17. Adhesive films producible from adhesives as
10 claimed in claim 14.

18. Coatings, especially paint systems, producible from coating materials, especially paints, as claimed in claim 14.

15

19. Substrates which comprise at least one adhesive film as claimed in claim 17 and/or at least one coating, especially paint system, as claimed in claim 18.

20

20. Substrates as claimed in claim 19, characterized in that they are moldings, films, and fibers as claimed in claim 16, motor vehicle bodies, industrial components, including electrical components, coils, and
25 packaging, or furniture.

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ABSTRACT

The invention relates to oligomers and polymers that contain at least one positional isomer diethyl octanediol as a monomer unit. The invention also relates to a method for producing the same and to the use thereof for producing molding compounds, adhesives and coating materials, especially lacquers. The invention especially relates to polyesters on the basis of 2,4-diethyloctane-1,5-diol and the use thereof in 2k-polyurethane lacquers.

10049656-021302

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)		Attorney Docket No.	IN - 5554
		First Named Inventor	Hubert BAUMGART et al.
<input checked="" type="checkbox"/> Declaration or <input type="checkbox"/> Declaration Submitted with initial Filing or <input type="checkbox"/> Declaration Submitted after initial Filing (surcharge) (37 CFR 1.16 (e)) required		COMPLETE IF KNOWN	
		Application Number	
		Filing Date	Wednesday, February 13, 2002
		Group Art Unit	
		Examiner Name	

As below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**OLIGOMERS AND POLYMERS ON THE BASIS OF DIETHYL-OCTANEDIOLS, METHOD FOR
PRODUCING SAME AND THE USE THEREOF**

(Title of the Invention)

The specification of which:

☒ is attached hereto
☒ Was filed on **14. August 2000** as United States Application or PCT International Application Number **PCT/EP00/07890**
and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application

I hereby claim foreign priority benefits under 35, U.S.C § 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate or 365 (a) of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below, by checking the box, any foreign application(s) for patent or inventor's certificate, or any PCT international application(s) having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date DATE/MONTH/YEAR	Priority Not Claimed	Certified Copy Attached?	
199 38 758.3	GERMANY	16. August 1999	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Additional foreign application number are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

I hereby claim the benefit under 35 U.S.C 119(e) of any United States provisional application(s) listed below:

APPLICATION NUMBER(S)

FILING DATE

☐ Additional provisional application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto

DECLARATION —

Utility or Design Patent Application

POWER OF ATTORNEY

☒ I hereby appoint the practitioner(s) associated with the Customer Number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith

☒ Customer Number or Bar Code Label

26922

PATENT, TRADEMARK OFFICE

or ☐ Correspondence address below

County	United States of America	Telephone	(248) 948-2019	Fax	(248) 948-2093
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name OF SOLE OR FIRST INVENTOR: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle (if any)) <u>Hubert</u>		Family Name or Surname <u>BAUMGART</u>	
Inventor's Signature <u>[Signature]</u>		Date <u>0701'02</u>	
Residence: City	<u>D-48163 Münster</u>	State	<u>Germany</u>
Country	<u>Federal Republic of Germany</u>	Citizenship	<u>German</u>

Mailing Address Am Domusch 44a

City	<u>D-48163 Münster</u>	State	<u>Germany</u>	Zip	
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DECLARATION —

Utility or Design Patent Application

POWER OF ATTORNEY

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PATENT-TRADEMARK OFFICE

or ☐ Correspondence address below

County	United States of America	Telephone	(248) 948-2019	Fax	(248) 948-2093
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Name OF SECOND INVENTOR:				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name (first and middle [if any])		Heinz-Peter		Family Name or Surname		RINK	
Inventor's Signature				Date		09.01.02	
Residence: City		D-48153 Münster		State		Germany	
Country		Federal Republic of Germany		Citizenship		German	
Mailing Address				Lohofener Weg 44			
City		D-48153 Münster		State		Germany	
Zip							

[Page 3 of 4]

Declaration for Utility or Design Patent Application (PTO/SB/01) [1-1.1]

Title Line One:: Title Line Two:: Title Line Three::	OLIGOMERS AND POLYMERS ON THE BASIS OF DIETHYL-OCTANEDIOLS, METHOD FOR PRODUCING SAME AND THE USE THEREOF
Total Drawing Sheets:: Formal Drawings?::	
Application Type::	Utility
Application Filing Date::	February 13, 2002
Docket Number::	IN-5554
Representative Information::	BASF Corporation, Patent Department 26701 Telegraph Road, Southfield, Michigan 48034
Attorney(s) Name:: Registration Number::	Anne Gerry Sabourin 33,772
Attorney(s) Name:: Registration Number::	Mary E. Golota 36,814
Attorney(s) Name:: Registration Number::	Michael F. Morgan 42,906
Representative Customer Number::	26922
Continuity Information	
This application is a National Phase of >Application One:: Filing Date::	PCT/EP00/07890 14. August 2000
Inventor One Given Name:: Family Name:: Street:: City:: Country:: Postal or Zip Code:: Citizenship Country::	Hubert BAUMGART Am Dornbusch 44a D-48163 Münster Federal Republic of Germany German
Inventor Two Given Name:: Family Name:: Street:: City:: Country:: Postal or Zip Code:: Citizenship Country::	Heinz-Peter RINK Lohofener Weg 44 D-48153 Münster Federal Republic of Germany German
Inventor Three Given Name:: Family Name:: Street:: City:: Country:: Postal or Zip Code:: Citizenship Country::	Detlef KRATZ Eckenerstr. 2 D-69161 Heidelberg Federal Republic of Germany German
Prior Foreign Applications Foreign Application One:: Filing Date:: Country:: Priority Claimed::	199 38 758.3 16. August 1999 Germany Yes

DECLARATION —

Utility or Design Patent Application

POWER OF ATTORNEY

☒ I hereby appoint the practitioner(s) associated with the Customer Number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith

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County	United States of America	Telephone	(248) 948-2019	Fax	(248) 948-2093
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

3-08

Name of Additional Joint Inventor, If any: <input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name (first and middle (if any)) <u>Detlef</u>		Family Name or Surname <u>KRATZ</u>	
Inventor's Signature <u>[Signature]</u>		Date <u>11.01.02</u>	
Residence: City	D-69161	State	Germany
	<u>Heidelberg</u>	Country	Federal Republic of Germany
		Citizenship	German
Mailing Address <u>Eckenerstr. 2</u>			
City	D-69161 Heidelberg	State	Germany
		Zip	

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